The MAC Flyer
MAY 1
"Any Time, Any Place" . . . page 4

# The MAC Flyer


MILITARY AIRLIFT COMMAND

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For Greater Safety and Efficiency in MAC Air Operations.


MACRP 127-5 MAY 1983 Vol XXX NO. 5

page 9

page 20

page 25


Meet MAC's New Director of Safety...3
"Any Time, Any Place".....4
AWTH's Corner.....8
A Last Encounter.....9
A Laboratory on Wings.....12
Thunderstorms.....16
Excellence in Airmanship.....19
More Mods for the Starlifter.....20
Flying-Hour Milestones.....24
C.R. Terror.....25
Quick Stoppers.....28



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Contributions, comments and criticisms are welcome. Write: *The MAC Flyer*, HQ MAC/IGFE, Scott AFB, IL 62225; or call 618-256-3534, or Autovon 638-3534. The editors reserve the right to make any editorial changes in manuscripts which they believe will improve the material without altering the intended meaning.

Subscriptions are available from: The Superintendent of Documents, Government Printing Office, Washington, D.C. 20402. Changes of address for subscription mailing should be sent to GPO. Give both old and new addresses, including zip codes. USAF Active and Air Reserve Forces units establish requirements for this magazine through their publication distributor (DAPD). Other U.S. Military units should consult administrative directives. *The MAC Flyer* is published at an approximate ratio of one magazine for every five MAC aircrew members, and one for every twenty MAC support personnel.

Distribution F, X; OPR: HQ MAC/IGFE
ISSN 0024-708X


**Cover Photo: Stained glass window at Hurlburt Field Chapel honors the American crewmembers killed in 1980 Iranian hostage rescue attempt. Photo by SSgt Alan Dockery.**

TMF Interview

**The *Flyer* staff is proud to ask our readers to....**

Colonel John G. Stephen, USAF, MAC Director of Safety.

# Meet MAC's New Director of Safety

Colonel Stephen graduated from the Aviation Cadet program in 1955 and since then has flown a wide variety of transport aircraft, including the C-119, C-124, C-54, C-130, AC-130, C-141 and C-5. He participated in the initial C-5 testing program at both Edwards AFB, California, and Charleston AFB, South Carolina, prior to a tour in Thailand flying the AC-130A gunship. Following his SEA tour, he was Chief, Aircrew Standardization Division at 21st Air Force. He was then assigned to Dover AFB, Delaware as the commander of the 9 MAS before assuming duties as Deputy Commander for Operations at the 436 MAW. Prior to his selection as the Director of Safety he was assigned to the HQ MAC Inspector General's Staff as Chief, Base Support Division and Deputy Director of Inspection. Colonel Stephen is a command pilot with over 11,000 accident-free flying hours.

**TMF:** Would you share your safety philosophy with us?

**Col Stephen:** Safety is an individual as well as a supervisory responsibility. Individuals must know their own capabilities and especially their limitations created by mental or physical fatigue. But they must also be aware of the limitations, dangers and performance capabilities of the equipment they operate. When individuals combine all these factors, they get a "safe operating window"— a set of working conditions where the job gets done safely. The job of our supervisors is to insure their people are properly trained to know these limitations and to know when and how to perform their jobs safely.

**TMF:** What are your goals as the new MAC Director of Safety?

**Col Stephen:** My primary goal—our primary goal—must be reducing our mishaps. We can't afford to have people disabled due to injuries or equipment inoperative due to mishaps because they affect our capability to accomplish our mission. To reduce the number of mishaps, we must continually emphasize the key role each individual plays in the safety program. Together we must identify deficiencies in our equipment, our training and our operating procedures, and then work together to correct them.

**TMF:** What do you see as the biggest obstacles to our accident prevention program?

**Col Stephen:** Training and complacency! Proper training ensures we are proficient at accomplishing our assigned tasks and significantly reduces the risk factor. But we have to be constantly alert for complacency. As we routinely perform our various duties, it's very easy to take safety for granted. When complacency increases, so too does the risk of a mishap.

**TMF:** Do you have any advice for the troops in the field?

**Col Stephen:** I encourage each individual to stay involved in the safety program, for it is your support of safety that makes it work. The safety people at all levels are anxious to support you in any way they can, but the best safety team is one on which everyone works together. I need your help to make an excellent safety program even better. ★

## The 1st Special Operations Wing is ready....

# "Any Time, Any Place"

by Major James M. Lee
Supervising Editor

The roar of the powerful 3,000 horsepower piston engine was deafening as the camouflaged A-1E streaked over the highway and pulled up sharply into a left closed pattern. In its wake, a flight of two OV-10s whined overhead, heading out to practice with rockets and machine guns. Viet Nam? No! It was Hurlburt Field, Florida, May 1970, and I had just arrived there to become a forward air controller (better known as FAC) in the O-2A "Skymaster." Now, 13 years later, I once again arrived at Hurlburt, this time as a member of a MAC Safety staff assistance team. The A-1Es and their powerful roar were long gone, as were the OV-10s and O-2s, but the spirit and excitement of my first visit were still there, as powerful and overwhelming as they had been 13 years earlier.

### History

Spirit and pride—those two words sum up the history of what is now known as the 1st Special Operation Wing, or 1 SOW. They also describe its present and its future as a part of MAC.

The origin of this highly decorated wing goes back to World War II to Hailakandi, India. It was there in March of 1944 that the 1st Air Commando Group was created to provide fighter cover, air strikes and airlift for Wingate's Raiders operating behind enemy lines in Burma. But following the war, the group was transferred back to the United States and disbanded in October 1948.

The Air Commandos and the concept of special operations lay dormant until 1961 when President John F. Kennedy called on the military to train its forces to fight guerilla warfare; especially against communist-inspired wars of national liberation.

The Air Force responded by activating the 4400th Combat Crew Training Squadron at Hurlburt Field in April 1961. Less than a year later, the organization was upgraded to a group, and in 1963 was redesignated the 1st Air Commando Wing. In 1968 it became the 1st Special Operations Wing, part of the Air Force Special Operations Force. Following consolidation, it was renamed the 834th Tactical Composite Wing in July 1974, but reassumed its historic name as the 1st Special Operations Wing in July 1975.

It was during the Viet Nam conflict that Air Force special operations forces were at their largest, encompassing 31 squadrons and more than 10,000 personnel and 550 aircraft. At the peak of the war, Hurlburt teemed with activity as countless crewmembers received special operations training and headed to Southeast Asia to fight the war. Their legacy lives on in the 3,500 men and women who now make up the 1 SOW.

The Skyraiders and Broncos that once filled the flight line at Hurlburt have now been replaced by newer, more sophisticated aircraft such as the AC-130H "Spectre" gunship, the MC-130E "Combat Talon," the HH-53H "Pave Low," and the venerable UH-1N "Huey." It's these aircraft and the people who fly, support and maintain them that carry on the proud tradition of the first "Air Commandos."

## AC-130 "Spectre"

The AC-130H brings to MAC a true "offensive" weapons system. Equipped with side firing weapons including twin 20mm Vulcan cannons, a 40mm Bofors cannon and the lethal Army 105mm howitzer, this highly modified C-130 is well equipped for its wartime roles of armed reconaissance, interdiction and close air support. But all this weaponry is useless if it can't be brought onto targets. This is where the Spectre excels.

Protruding from the left side of the AC-130s are a variety of highly sophisticated sensors. These include an infared sensor system and low-light television. Information from these systems is fed into an onboard computer that combines it with aircraft performance data such as airspeed, altitude, bank angle and distance from the target. The gun alignment and firing computations are then automatically figured by the computer which aims the guns when firing begins. According to experienced AC-130 crewmembers, after four or five rounds are fired from the 105mm howitzer, the computer is able to calculate the winds between the aircraft and the target and over 90 percent the succeeding rounds will be direct hits on the target. It was just such accuracy that earned the Spectre its reputation as a devastating truck killer during the latter part of the Southeast Asia conflict.

A 1 SOW MC-130E "Combat Talon" over Florida.

The power of an automatic weapon is demonstrated to students of the Dynamics of International Terrorism Course taught at Hurlburt.

The gunships are also equipped with a 2-kilowatt searchlight for illuminating target areas. Because of this capability, they've been used extensively for night search and rescue operations. In fact, an AC-130 was instrumental in the night rescue of survivors of a commercial aircraft that crashed in the Everglades near Miami in 1973. It orbited the area and illuminated the crash site, directing rescuers to individual survivors in the scattered wreckage.

The AC-130H is flown by the 16th Special Operations Squadron (SOS) at Hurlburt, the only active duty squadron in the Air Force to operate the Spectre gunships. The slightly different AC-130A model gunships are flown by Air Force reservists from the 919th Special Operations Group, located at Duke Field, north of Hurlburt on the Eglin AFB reservation.

### MC-130 "Combat Talon"

The MC-130E Combat Talon "Blackbird" has also received extensive modifications and performs a variety of unconventional warfare support missions. One of the most interesting modifications is the addition of the Fulton recovery system. Designed as a means to rescue downed crewmembers, the system has been in development since 1963 and is operational on the Blackbirds. The aircraft have been outfitted with a yoke on the nose which resembles the feelers of a large beetle. The yoke is normally folded back against the fuselage and is extended hydraulically into the recovery position. In addition, there is a special hydraulic winch used to reel the rescued individual on board the aircraft.

In actual operation, the person on the ground is airdropped a special kit containing a harness suit, a lift line, a balloon and two containers of helium. The individual opens the kit, dons the suit, ensures the lift line is attached to both the suit and the balloon, then inflates the balloon with the helium and lets it fly. The pilot of the MC-130 then maneuvers the aircraft to intercept the lift line with the yoke, flying at an altitude of 400 feet and a maximum airspeed of 150 knots. Once the line is intercepted, it is attached to the aircraft by a special lock. The individual is then pulled smoothly into the air and winched on board the Blackbird. In the event the aircraft fails to intercept the lift line, there are two fending wires running from the nose of the aircraft to each wingtip which fend off or cut the lift line. If the line is cut, the individual on the ground is dropped another kit and the process is repeated.

AN HH-53H "Pave Low" hovers prior to departure.

The Combat Talon aircraft are also designed and equipped for all-weather, low altitude penetrations of hostile airspace. Fitted with advanced terrain following and ground mapping radars, an infared system, and both Doppler and inertial navigation systems, the aircraft is capable of making extremely accurate high speed, low altitude airdrops to small drop zones, day or night. Special communication and electronic warfare equipment aids the Blackbird in this role. As with the AC-130H, the MC-130E is air refuelable. The Combat Talon is flown by the 8 SOS at Hurlburt, the 1 SOS at Clark AB, Republic of the Phillipines, and the 7 SOS at Rhein-Main AB, Germany.

### Helicopters

Rotary-wing aircraft also play a vital role in the 1 SOW mission. The 20 SOS, known as the "Green Hornets," flies both the HH-53H "Pave Low" and UH-1N "Twin Huey" helicopters, and is the only special operation helicopter squadron in the active duty Air Force.

### HH-53 "Pave Low"

Assigned to the 1 SOW in 1980, the HH-53H was acquired to provide airlift capability for special operations missions. The Pave Lows are equipped with retractable air refueling probes, an external hoist, two

jettisonable auxiliary fuel tanks and armor. They can be armed with up to three 7.62mm miniguns or three .50 caliber machine guns to provide suppressive fire.

These specially equipped helicopters have both night and adverse weather capability, provided by terrain following, terrain avoidance, and ground mapping radars, a forward looking infared system, Doppler and inertial navigation systems. The Pave Low helicopters have the missions of low-level penetration for infiltration and exfiltration, aerial gunnery and reinforcement and resupply of unconventional warfare forces worldwide.

### UH-1N "Twin Huey"

The 20 SOS uses its Twin Hueys to provide gunship coverage, infiltration and exfiltration of reconaissance and combat control personnel, and medical evacuation of casualties. To accomplish these diversified missions the twin turbine helicopters can be outfitted with searchlights, personnel rescue hoists, machine or gatling guns, rocket pods and loudspeakers. The Twin Hueys are also flown by Detachment 1, 2d Air Division, at Howard AB, Panama.

### USAF Special Operations School

Another major organization at Hurlburt is the USAF Special Operations School, now a part of the 2d Air Division. Originally established as the Special Air Warfare Indoctrination Course, it was conducted in conjunction with the USAF Air Ground Operations School (another Hurlburt-based Air Force school) and Air University, and was primarily an orientation course on Southeast Asia. Since its beginning in 1964, the school has grown steadily and now has the Air Force-wide responsibility for conducting academic training related to special air operations. A listing of its courses demonstrates its wide range of instruction.

—The Foreign Internal Defense Course was originally called the Air Force Counterinsurgency Course and provides a basic orientation on the problems of insurgencies, their causes and methods to defeat them.

—The Psychological Operations Course provides selected U.S. and NATO officers, senior NCOs and civilians with a basic understanding of the principles and techniques of psychological operations.

—The Unconventional Warfare Course is designed to instruct selected DOD personnel in the concepts of unconventional warfare, including terminology, organization, capabilities and applications.

—The Dynamics of International Terrorism Course provides students with an awareness of the terrorist threat overseas. Areas addressed include: the psychology of a terrorist, terrorist tactics and technology and transnational and regional terrorist groups. A major goal of the course is to provide instruction in the principles of personal security in overseas areas.

—The Cross Cultural Communications Course aids DOD people who train, negotiate or contract with foreign nationals in this country. It seeks to improve students' communicative skills and sensitizes them to different cultural values, behavior, assumptions and perceptions.

—The Crisis Response Management Workshop provides senior military personnel the principles for identifying, planning and managing the temporary application of limited force during an international crisis.

—The Middle East Technical Assistance Field Team (TAFT) Orientation Course teaches newly-assigned field team members about their roles and mission. Also discussed are living and working conditions, history, economics, religion and cultural aspects of the area.

### Combat Control Team

The Special Operations Combat Control Team (SOCCT) is yet another organization with a proud heritage. Known as the "Pathfinders" during World War II, the CCT has done everything from establishing drop zones and guiding aircraft to targets in remote areas, to helping reestablish communications during disasters. Team members are trained in parachute jumping, air traffic control, radio maintenance, scuba diving, forward air control operations and much more.

### Future

The men and women of the 1 SOW are the product of a rich and highly decorated history and are looking forward to an equally prestigious future under MAC. Their motto explains their mission and their motivation—"Any Time, Any Place." From *TMF*, welcome to MAC.

# AWTH's Corner

**Attention AWTH submitter— code XYZ**

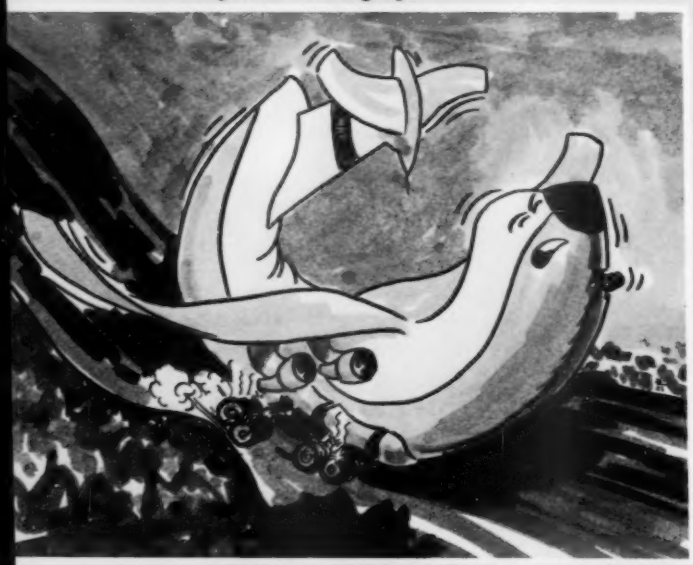
The AWTH monitor at HQ MAC Safety needs more information concerning your input. Please let him know how he can contact you.

### Landing Illusion

Primary problem: Spatial disorientation.

This AWTH discusses a visual illusion problem.

"A 'high spot' in the runway approximately 2,000-3,000 feet from the departure end of runway 09 at Alexander Hamilton airfield at St. Croix, Virgin Islands, creates the illusion from the cockpit that the runway is shorter than it actually is. After landing slightly long with a heavyweight aircraft, we were still looking at 110 knots indicated air speed (KIAS) when it appeared the end of the runway was coming up."



"We selected reverse but were above the recommended maximum airspeed. Although no hot brakes or other problems were experienced, we did get a definite visual illusion. The rise in the runway and the absence of runway distance markers might cause a crew to overreact during a takeoff abort or hot touchdown and ensuing high speed roll out. This runway illusion should be brought to the attention of MAC aircrews via a note in the IFR supplement."

### Smoking—Hazardous to Your Health!

Yet another crewmember wrote us to advise us of the hazards of smoking in the cockpit.

"Although this report involves no near mishaps, it surely has the potential for just that—or maybe worse. Smoking while flying should no longer be regarded as a non-threatening habit by the aviation community. The evidence speaks for itself. Discussions with local physiological training units and the FAA reveal a lot of disturbing information. Elevated poisonous and noxious gas levels in the bloodstream, night-vision impairment and increased susceptibility to vertigo are among problems caused by smoking. When we combine these effects with night low-level contour flying, it makes for a potentially dangerous situation. Low-level flying is increasingly becoming MAC's business and we need to evaluate all factors which could impact our people and equipment."

Editor's Note: MAC flight safety closely monitors AWTH reports to determine any adverse trends. If a trend does develop, we take action or refer the problem to the appropriate Headquarters MAC directorate for their review and action.

# A Last Encounter

**The "Ghost of Navigators Past" visits an INS.**

**by Lt Col Arthur Covello (USAFR Ret)**
**514 MAW (Assoc) Public Affairs**
**McGuire AFB, NJ**

Only the glow of the dimmed lights in the Starlifter cabin revealed the presence of three crewmembers—the pilot, copilot and flight engineer. With their eyelids drooping, they stared into the murky darkness of the North Atlantic night as their Starlifter droned to a destination still hours away. In the same cabin, a gyro-fed computer, the aircraft's inertial navigation system (INS), flashed their position, ground speed and spot wind, solving in milliseconds navigation problems it had taken the ancient Phoenicians many hours to do. To C-141 flyers, the instrument had a mystical, superhuman accuracy; a quality even the best navigator could never duplicate. Above the INS, plain black plates covered the empty spaces of an area once referred to as the "navigator's instrument panel." The INS had relegated the tube-operated computers, compass needles, radio dials and other instruments to the scrap heap.

Unknown to the crew, a figure quietly slipped into the empty navigator's seat. It was the "Ghost of Navigators Past." As he had done many times in the past, he pushed the "recline" handle and leaned back to a more comfortable position. Although the crew heard a "click," they paid no attention to it. Suddenly spotting the navigator, a surprised INS blurted, "What are you doing here?"

"Thought I'd come along for a last look and final ride," the apparition replied.

Honorable Mention, 1982 MAC Flying Safety Writing Contest

"Well, good to see you again." The INS silently clicked off another degree of longitude. "How have you been?"

Looking at the clear table in front of him, the Nav answered, "Okay. This table was never big enough for all our charts, almanacs, star tables and plotters. Amazing!"

"It's different now. Sorry to have grounded you guys. We're so easy to operate, you see, even the pilots have learned how to use us." The INS flashed the leg alert light for the pilots' benefit.

"Yeah, I know. You're pretty accurate too." The crew watched as another tenth of a degree clicked off. "But we could always do a few things you still can't do."

"Rubbish! Only humans care about those things."

"Right! Now you're catching on. Can you compute fuel needed to a second alternate, or a third one, when the primary is socked in?"

(Hesitating, while computing a new ground speed) "Well...no...but..."

Smiling, the ghost continued to fire questions at the electronic marvel at a dizzying rate. "And how many good jokes do you know for those long flights with the Midnight Airlift Command? How many approaches have you monitored lately when the weather was down? Did you ever have to wake up two sleeping pilots with an airep position report?"

## "Thought I'd come along for a last look and final ride."

Showing surprise, the INS asked, "Like what? My cohorts and I are the ultimate in air navigation systems."

"Well, let's see. How good are you on radar, especially at spotting a mountain peak at altitude after having to make a 180° turn away from final at Elmendorf?" The spirit sat up, adjusting the focus on the radar scope. "You have to know how to read charts for that. And speaking of mountains, do you know how to distinguish a mountain from a thunder bumper on a radar scope? We did things like that. And—oh, well, you'll never make a crewmember."

"What do you mean?" the INS asked indignantly. "I do what I was designed to do. I'm wired for precision." Then, as if to "show its stuff," the INS displayed yet another new latitude and longitude, accurately of course, to within a tenth of a minute of one degree.

"Yeah, yeah, but did you ever take part in a bag drag—especially out of Yokota—right before Christmas?"

"A 'bag' what?" The INS was confused by the term.

"Never mind. You see, a crewmember does more than his job description calls for. For instance, do you know any restaurants in Madrid, or where you can find a 'cool one' at Rhein-Main at 4 in the morning?"

Both the INS and the Ghost of the Navigator chuckled at that one, with the INS almost missing his longitude.

Just then, the AC straightened in his seat and turned to look over his right shoulder. He pressed his intercom button. "Hey, copilot, did you hear some talking from the nav's seat?"

The bleary-eyed lieutenant looked at the AC quizzically, then answered, "Don't think so, but it's time for a position report." Stifling a yawn, he leaned over the HF-radio and began twirling knobs. The flight engineer, a burly master sergeant, overheard the conversation and chimed in, "Think you've flown too much this month, captain."

"Pretty weird," replied the AC, undaunted and shaking his head. "It sure sounded like talking and laughing." The copilot, muttering something about tired aircraft commanders, continued his search for a usable Croughton Airways frequency.

Resuming conversation with the Nav, the INS continued. "But in spite of all that, you must admit I do a better, more precise job. No more hang-ups about LORAN sky waves and no more celestial, unreliable dopplers and that primitive, poor-man's computer, the ASN-24. And no more of that, ugh, CONSOLAN. We don't worry as much about course

violations anymore, either. Man, this is the space age!"

Resignedly, the Nav agreed. "Yeah, I guess you're right. But it was a challenge." The Nav sighed and paused for a long moment. "Well, I should be moving along."

The Ghost of Navigators Past raised himself out of the seat and, stepping towards the cabin door, paused to glance up forlornly at the plate that covered the spot where he had, hundreds of times before, aimed a periscopic sextant at Dubhe, Arcturus, Sirius and other celestial bodies incomprehensible light years away. He sadly remembered the problems he'd had with LORAN C; the ambiguous, shimmering blips—never certain which ones had bounced off that indeterminate layer called the ionosphere and which had come directly to his receiver. Memories flashed by of friendly, faceless voices on 127.4 mhz—coastguardsmen manning ocean stations and giving radar positions to specks in the sky. How they chit-chatted, he thought, to break the monotony of 30 days at sea.

Yes, he too, like the INS, thought European CONSOL, a system of radio navigation contrived by the Germans in World War II to assist their U-boats in North Atlantic waters, too archaic for the space age. But he had more respect for the system when the interminable dots and dashes, which he converted to lines-of-positions, pulled him out of some tight spots.

With a wry grin which no one could see, he poignantly recalled his sweaty palms when faced with an inoperative doppler; of the challenges of accurate positioning on the congested North Atlantic Track Systems and of his relief when an Irish-accented voice would announce, "You're okay, MAC, about 5 miles south of course." It was so easy now. He wondered, though, as the grin left his face, what instrument would be developed to replace his eyes on a radar scope and ONC chart, looking for high terrain during the "critical phases" of flight. His thoughts were interrupted by a call from the INS.

Choking back a tear, the INS had one final remark. "Hey, Nav, before you leave, I want you to know something. We all miss you."

The unusual emotional strain on the INS caused the INS Warn Light on the pilot's panel to flash. Both pilots reacted instantaneously: the aircraft commander reached for the number 2 INS control switch (number 2 was asleep), and the copilot grabbed his Dash One. It was as if the Starlifter had run out of fuel. Their alarm was only momentary, though, as the INS quickly regained its composure, extinguished the lights and began to operate normally again. "I swear," the aircraft commander explained, nonplussed and shaking his head, "there must be a ghost around here. Spooky!"

The Ghost of Navigators Past, now down to the floor of the cargo compartment and watching the excitement in the cockpit, almost laughed out loud. He raised his arm in farewell, and quoting from Omar Khayyam whispered: "I came like water, and like wind I go."

He turned, and in a second, had blended into the darkness. ✦

## ABOUT THE AUTHOR

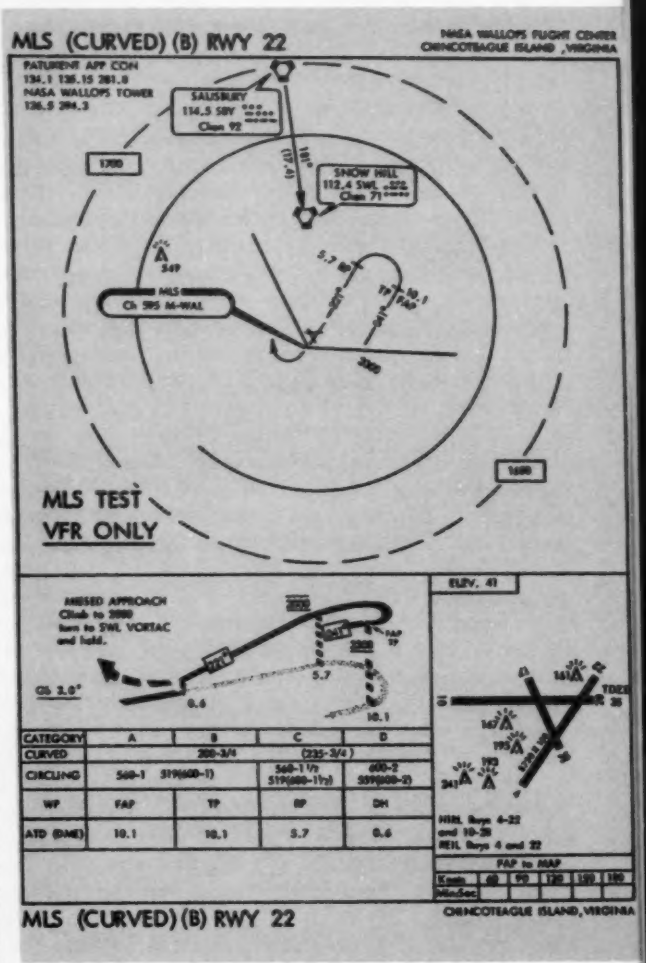
Lieutenant Colonel Covello entered the Air Force and navigator training following his graduation from St. John's University in 1952. During his career, he has flown RB-26s, C-119s, KC-97s, O-2s and C-141s. He was also an ROTC instructor at Kenyon College, Ohio. Lieutenant Colonel Covello holds a masters degree from Incarnate Word College, San Antonio, Texas and has been the 514 MAW Public Affairs Officer since 1976. He was a previous Flying Safety Writing Contest winner in 1974.

Photos courtesy NASA

**by Captain Byron L. Howard**
**Associate Editor**

Watching another pilot fly a plane is never quite the same as flying it yourself. Any pilot will tell you that. There's always a slight bit of apprehension watching someone else do what you feel you should be doing. Still, for this flight anyway, I was relegated to the role of observer, watching another pilot have all the fun. I was standing just behind the forward flight deck of the NASA Advanced Transport Operating Systems (ATOPS) program's flying research aircraft referred to as the Transport Systems Research Vehicle or TSRV. It's a Boeing 737-100 from all outward appearances, and on this flight, I was observing a test of the soon-to-be-common microwave landing system, the much-heralded MLS.

In the right seat of "NASA-515" was an experienced airline pilot with more than just a few hours in a 737. He was flying simulated instruments while a NASA Langley Research Center test pilot flew as the safety pilot and aircraft commander in the left seat. Our position was just abeam the NASA Wallops Flight Test Center's runway 22 on what would normally be a left downwind. On On this approach, though, we were actually about to intercept a curved glide path that would take us to a point just over 5 miles from the end of the runway in a gentle, descending arc. The right-seater would fly the approach on a standard set of cockpit instruments—flight director, HSI, airspeed indicator, VVI—with the only difference being the signals coming from the ground. Instead of an "old fashioned" ILS, this 737 was equipped to fly the MLS.



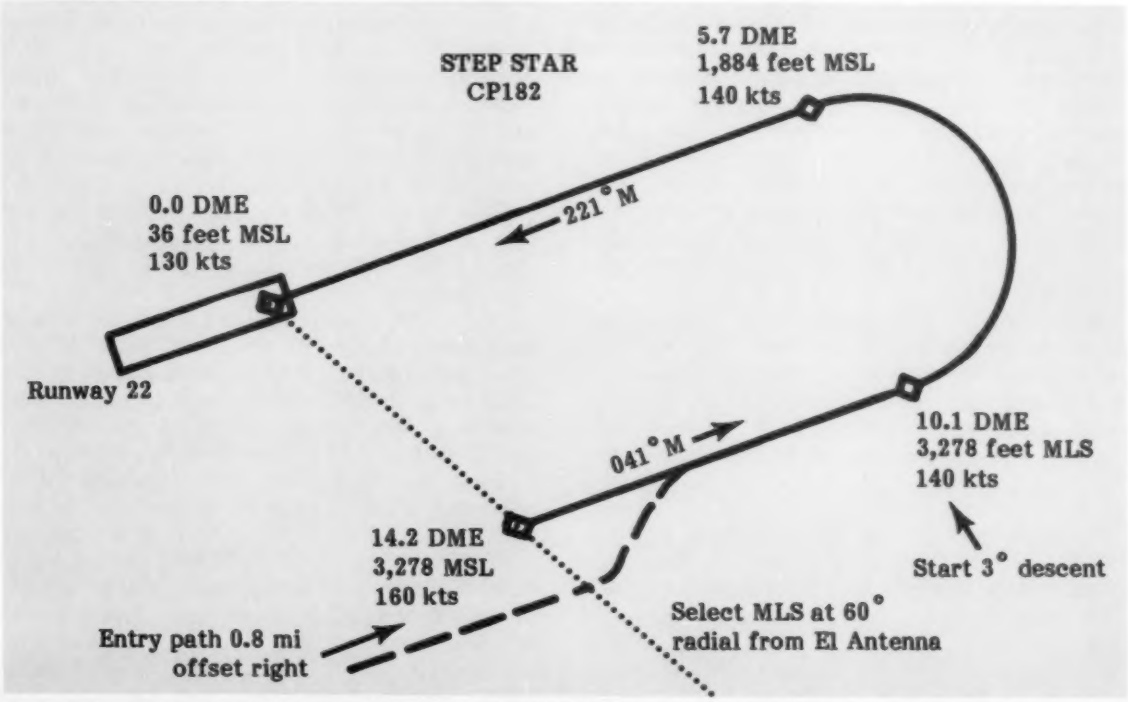
As we passed the approach end of runway 22 heading 041°, the course indicator on the HSI told us we were on "centerline," our altimeter indicating 3,300 MSL. With the "needles" centered, our present course would take us to the combination turn point (TP) and final approach fix (FAF). This point was 10.1 nautical miles from the ground antenna as measured *around* the curved approach path. The approach path itself was a continuous series of points interpreted by an on-board computer and displayed in analog form on the flight director's ADI.

As the DME indicator clicked down to 10.1, the course indicator and bank steering bar on the ADI began a gentle but noticeable drift to the left while the pitch steering bar and glide path deviation indicator began to indicate "high." Right on cue, the pilot flying NASA-515 started a gradual left descending turn to keep the bars centered. The 737's vertical velocity stopped at around 600 feet per minute as we started "comin' 'round the curve."

A quick glance at the experimental approach plate showed that if the right seater did everything correctly, we would end up rolling out of the turn on final approach for runway 22, on course and at approximately 5.7 DME. (Since these experimental approaches can only be flown in daylight VMC, all other eyes on the flight deck had the added advantage of seeing exactly where we were going, a luxury *not* enjoyed by the test subject in the right seat—Ed.)

Sure enough and as advertised, at exactly 5.7 DME the right seater rolled the squat little twin-jet out on centerline. He continued to follow the MLS guidance down to the published minimums for the approach, 200 feet and 3/4 mile, before beginning a missed approach.

That the approach was flown with strictly MLS-derived data through a standard set of flight instruments was moot testimony to the potential of this new standard for all-weather approaches. That the approach was flown so precisely by a human was evidence that a new age of instrument flying is now here.




Depiction of a prototype curved MLS approach flown during joint NASA/FAA test using the TSRV. Similar complex approaches prove the flexibility of the MLS.

View of the TSRV Aft Flight Deck with advanced CRTs.

**TSRV—More Than a Plane**

The plane used in this test is, by itself, not all that unique. NASA-515 started out as the prototype Boeing 737-100 some years ago. Aside from its clean blue-and-white paint scheme, though, it looks and flies pretty much like any other 737. What makes this particular Boeing different from the rest is what lies inside its computer-laden interior. This plane, extensive simulation facilities and the people who work with them constitute an advanced technology research program designed to develop, evaluate and demonstrate new concepts of airborne systems and operational flight procedures. In a nutshell, the broad objectives of the ATOPS program are:

- To identify aircraft systems concepts and companion procedures permitting more efficient operations in the national airspace system (NAS);
- To promote the integration of improved airborne capabilities with the evolving NAS to achieve more efficient operations; and
- To improve aircraft capabilities to cope with external factors such as wake vortex, adverse weather, and airspace restrictions (including noise).

Located just across the field from Langley AFB, Virginia, the NASA Langley Research Center's dedicated ATOPS researchers are primarily concerned with identifying airborne systems—both avionics and air vehicle systems—that will be needed for efficient and safe operation in future high-density terminal areas.

Equal emphasis is also placed on identifying operational flight procedures required to work effectively in the ATC environment anticipated in the future. Other benefits from the ATOPS program research include:

- Reduced approach and landing accidents.
- Reduced weather restrictions.
- Reduced aircrew workload.
- Increased productivity for air traffic controllers.
- More efficient terminal area techniques yielding an increase in fuel saved.

Specifically, the ATOPS program looks at deriving these benefits in the areas of descent, terminal area transition, and approach and landing. The program's principal interest is to develop improved aircraft performance, automatic functions and pilot management tools that will complement the FAA's development of improved ground systems.

One important part of the ATOPS program is defining the cockpit displays that will allow an aircrew to accurately follow curved approaches made possible by the MLS. Several promising concepts are under investigation including the standard flight director guided curved approach described earlier, as well as futuristic flight paths displayed on cathode ray tubes, or CRTs.

The TSRV-737 is well equipped to conduct this kind of advanced MLS research, too. In fact, NASA-515 was instrumental in testing the earliest MLSs during the "fly-off" between the American-Australian MLS, using the time-referenced scanning beam (TRSB) principle, and the British MLS, based on the Doppler principle. (Editor's note—The TRSB MLS was adopted by the ICAO as the new world standard for precision approaches to replace the aging ILS. The replacement of ILS with MLS is already under way in this country as part of the FAA's new airspace allocation plan. All ILSs will be replaced with MLSs by the mid-1990s. Other advantages of the MLS have been discussed in previous *TMF* articles. See March 1982, "The Microwave in Your Future," and October 1982, "Flying the Microwave Landing System.")

**It's What Inside That Counts**

The ATOPS research aircraft carries a multitude of systems for monitoring and analyzing a particular test flight. Included in the aircraft are:

- Sophisticated cockpit and display system simulations;
- MLS in which the aircraft can fly curved paths under controlled conditions;
- Digital two-way data link between the aircraft and the ground;
- Precision tracking;
- An oculometer system to measure the pilot's "eye-look" point.

In all, there are basically five major subsystems installed in and integrated with the basic 737-100 airframe. These are:

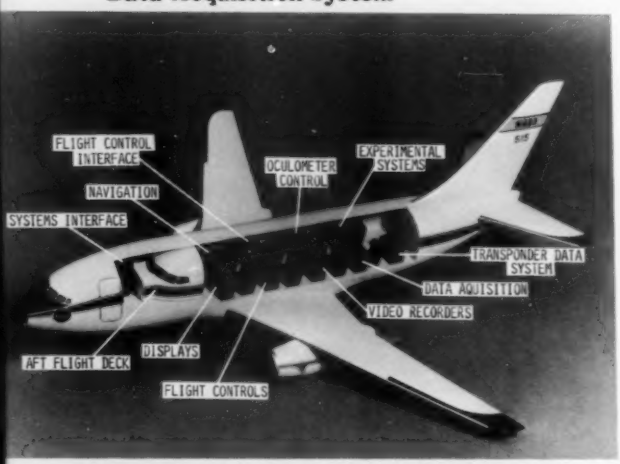
Aft Flight Deck (AFD)

Flight-control Computers

Navigation/guidance Computers

Electronic Displays

Data Acquisition System




Cutaway view of the Boeing 737-100 TSRV main systems.

Each of these is an important part of the entire ATOPS test program, but let's take a closer look at just one of these subsystems—the Aft Flight Deck, or AFD.

Installed in the passenger compartment, the AFD is a second cockpit from which the aircraft can be flown in a fly-by-wire mode. The basic airplane has been modified for this and the primary flight controls, flaps and throttles can be controlled from the AFD. This is a limited authority system which can be overridden or disconnected by the forward flight deck safety pilots .

In the AFD are three CRTs for each pilot. The Vertical Situation Display (VSD) can present any of a number of formats, but at the present time, an electronic attitude direction indicator, or EADI, is displayed. In addition to normal flight attitude symbology, the EADI can be superimposed on a forward-looking TV image displayed on the VSD. This gives the pilot the added visual references needed to smoothly and safely transition from instrument approach conditions to visual landing cues.

The electronic horizontal situation indicator, or EHSI, is significantly different from today's analog HSIs. For instance, computer projected vectors or paths can be called up and a selected aircraft's flight path can be predicted. Too, MLS or ILS courses can be called up so the pilot can see without doubt where he or she is in relation to a desired point or course. Terrain, traffic, waypoints, airports, trend vectors and the like can be projected to give the pilot a wealth of information needed to fly the plane within a terminal area safely and efficiently.

The last CRT is the navigation control and display unit. A combination computer input keyboard and CRT display, the unit allows the pilot to see his inputs in the ATOPS' navigation and guidance units by means of 8 rows of 24 alphanumeric characters. As the information is input into the nav computer, it stores direct routes, airways, SIDs, STARS, and runway data for the particular geographic area of interest.

Keep in mind the ATOPS has been actively flying for some time now, but its ability to change with the times and technology makes it one of the most cost effective research programs ever devised. It's an impressive airplane with impressive men and women to go with it, all dedicated to safer and more efficient flying in the future.

# Thunderstorms—

Have you ever wondered what your chances were of encountering a thunderstorm of the cumulo-bumpus variety? Not very likely, you say? Wrong again ozone breath! According to the experts at Air Weather Service (AWS), approximately 44,000 thunderstorms occur daily over the earth's surface. Now since our MAC missions take us over a goodly portion of the globe on a daily basis, the chances of meeting up with one of these monsters is much higher than we'd like to believe.

But we have excellent coverage from ground-based weather radar—right? Again, not exactly true. What about those areas of the world which aren't blessed with state-of-the-art weather radars? What if your trusty aircraft's radar is inop (if equipped with one in the first place)? It just might be worth your time to take a few minutes to review the hazards associated with these powerful natural phenomena.

Thunderstorms contain many, if not all, of the most severe weather hazards to flight. They are almost always accompanied by severe turbulence, strong surface gusts, wind shear, lightning, heavy rain showers and severe icing. Add to this the fact that hail is common and tornadoes possible, and thunderstorms become obvious things to avoid—at all costs.

While hazardous turbulence is present in *all* thunderstorms, in a severe thunderstorm it can cause extensive damage to aircraft and injury to passengers and crew. The strongest turbulence in thunderstorms occurs within the shear between updrafts and downdrafts. But turbulence is often encountered *outside* thunderstorms, with turbulence reported several thousand feet above and 20 miles laterally from a severe storm. It can also occur in the anvil, 15 to 20 miles downwind.

Extremely strong low-level turbulence occurs in the shear zone between the thunderstorm downdraft and the surrounding air. Appearing as far as 10 to 15 miles ahead of a mature storm, it is commonly called the gust front. Significant horizontal wind shear occurs across the gust front, and wind speeds may increase as much as 50 percent between the surface and 1,500 feet AGL.

We're all aware of the tremendous destructive potential of hail, or at least we should be. As a general rule, the larger the storm, the more likely it is to contain hail. But hail has been encountered as high as 45,000 feet in completely clear air, and may be carried up to 10 miles downwind from the storm core. You should anticipate hail with any thunderstorm, especially when flying beneath the anvil.

Another common thunderstorm hazard is icing, which usually occurs at temperatures from 0° to -20° C. The most severe icing in a thunderstorm, though, is encountered at altitudes just above the freezing level. Since heavy rain and lightning strikes occur most frequently in the vicinity of the freezing level, this altitude appears to be the most hazardous to flight, as far as weather is concerned.

According to the AWS folks, lightning and electrostatic discharges are the leading causes of reportable weather-related mishaps in the Air Force. Lightning is found at all levels in a thunderstorm, and the majority of lightning discharges occur between clouds and within the same cloud. However,

# A Quick and Dirty Review

numerous aircrews have been struck by the proverbial "bolt out of the blue" while cruising in the clear. Although electrostatic discharges usually cause only minor damage to aircraft, currents induced in aircraft electrical systems have caused bomb doors to open and impaired the accuracy of electrical equipment, including navigational systems. Lightning, on the other hand, can cause severe damage to airborne aircraft. Reports of shattered radomes (the most commonly struck area on aircraft) are common. Fuel tank explosions and structural failures are certainly much less common, but very possible.

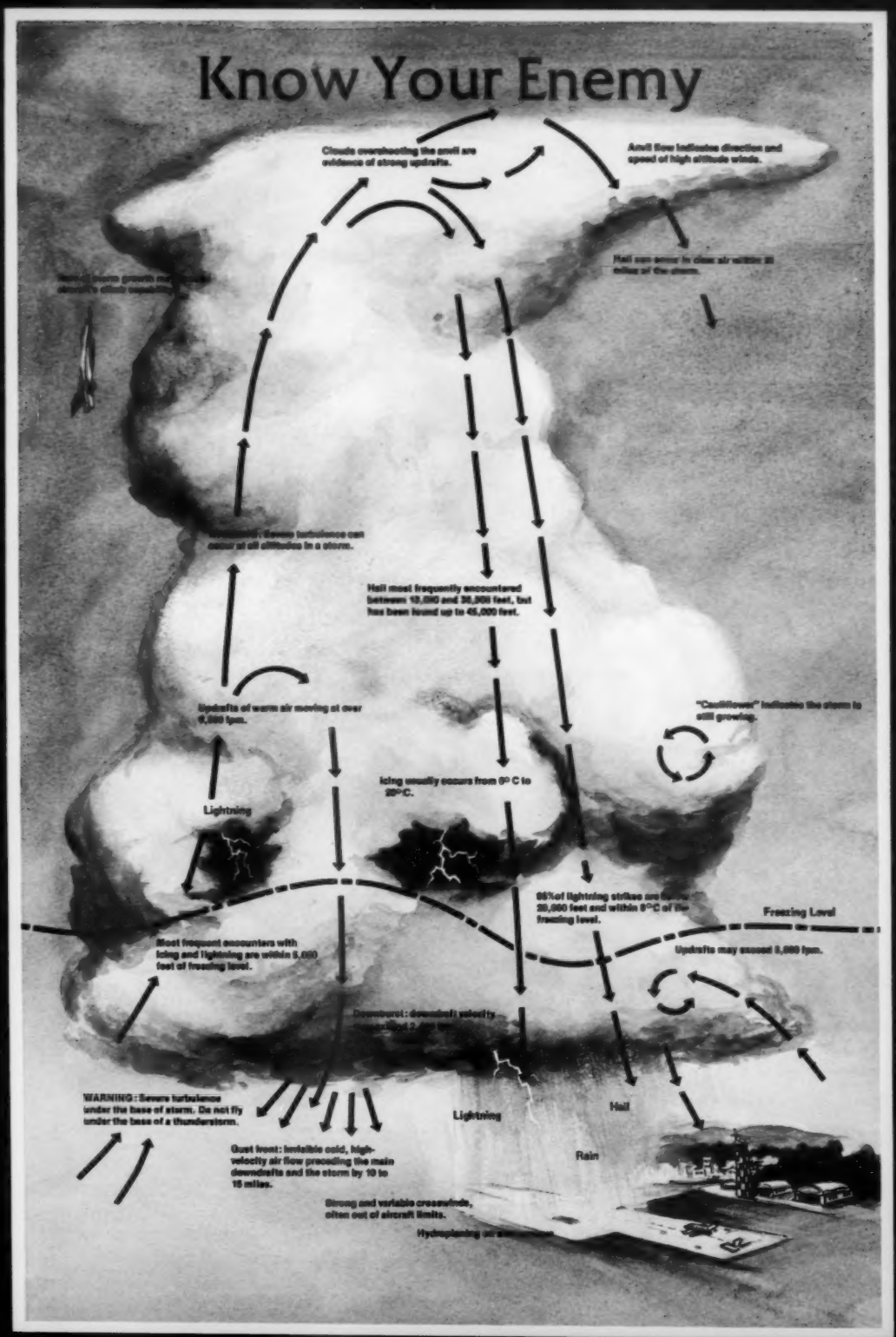
Most lightning strikes and electrostatic discharges occur in or near thunderstorms or precipitation, including snow, and within 8° celsius of the freezing level. Strikes have also been reported within the thick cirrus deck from a decayed thunderstorm. AWS emphasizes that all of the above conditions do *not* have to be met to get a lightning strike or an electrostatic discharge.

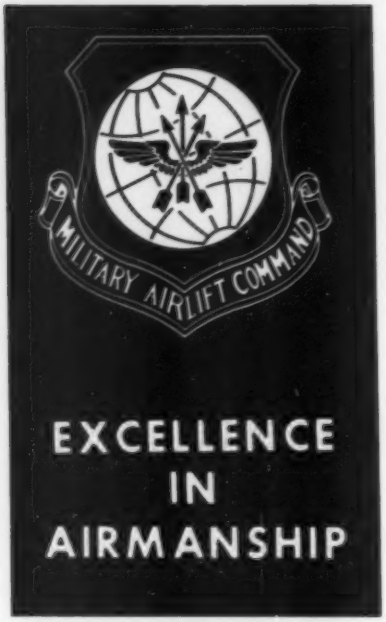
The obvious question here is—how do I avoid a lightning strike? The answer is simple. First, know and comply with thunderstorm avoidance criteria published in Air Force and command directives. Remember that any large cumulus-type cloud has the potential to cause a lightning strike. Common sense indicates you should avoid prolonged flight near the freezing level, expediting climbs and descents through that area, if at all possible. Those of you involved in formation flying should be aware that lightning has also been known to simultaneously strike several aircraft in a formation.

What about the times when I have no choice but to penetrate a thunderstorm—when I have no other course of action? Well, there are a few general guidelines you should follow which will minimize the potential for damage to your aircraft. Before penetrating and if time permits, contact the nearest weather radar facility for information, and use your aircraft radar, if available. Check your instrument and cockpit lights are on bright—use thunderstorm lighting if you have it—and turn on the pitot heat. Also make sure all crewmembers and passengers are securely strapped in, and double check cargo retraints. Slow to your aircraft's recommended turbulence penetration airspeed before entering the thunderstorm, and try to maintain a constant *attitude*—avoiding the tendency to chase the altimeter. Above all, don't fly under the anvil and don't penetrate the storm near the freezing level. If you should *accidentally* penetrate a thunderstorm cell, don't turn around. Attempting to do so will only keep you in the cell longer and increase the stress on the aircraft and the possibility of aircraft damage.

There, that wasn't too bad, was it? A few minutes of your time and you get a quick and dirty look at the hazards of flying in or near thunderstorms. Remember, with your luck and Murphy's Law, you just might be the poor soul who encounters one of those 44,000 daily thunderbumpers. Fly safe and think avoidance. ★

--Adapted from "*Aviation Weather Hazards*" slide/tape program (600206 DF).


Know Your Enemy
Clouds overshooting the anvil are evidence of strong updrafts.
Anvil flow indicates direction and speed of high altitude winds.
Hail can occur in clear air within 20 miles of the storm.
Severe turbulence can occur at all altitudes in a storm.
Hail most frequently encountered between 15,000 and 30,000 feet, but has been found up to 45,000 feet.
Updrafts of warm air moving at over 6,000 fpm.
"Cauliflower" indicates the storm is still growing.
Icing usually occurs from 0° C to 20°C.
Lightning
Freezing Level
Most frequent encounters with icing and lightning are within 5,000 feet of freezing level.
Updrafts may exceed 6,000 fpm.
WARNING: Severe turbulence under the base of storm. Do not fly under the base of a thunderstorm.
Lightning
Hail
Rain
Gust front: Invisible cold, high-velocity air flow preceding the main downdrafts and the storm by 10 to 15 miles.
Strong and variable crosswinds, often out of aircraft limits.




**Captain Ligocki and Second Lieutenant Hamby, 1401 MAS,** were returning to Scott AFB in their CT-39A after a routine mission, where Captain Ligocki had planned to fly the runway 13 tacan approach to a PAR pickup. Departing the final approach fix at approximately 1,500 AGL and 180 KIAS, Captain Ligocki rolled into a right 25° bank to intercept the 9 mile arc to the final approach course. When he attempted to roll wings level, however, he felt the tension in the yoke suddenly lighten and the aircraft failed to respond. Realizing he would lose control if he didn't take quick and decisive action, Captain Ligocki used only rudder to right the stricken Sabreliner. Lieutenant Hamby assisted the pilot by declaring the inflight emergency, handling the radios and running the checklists.

Though the weather was VFR and the surface winds were only 5 knots, the winds at altitude were gusty, and Captain Ligocki had his hands full controlling the aircraft using rudder and elevator only. With the landing procedures briefed, the crew cautiously lowered 66 percent flaps in preparation for the landing. They also flew final approach 10 knots faster than normal to aid in rudder effectiveness. Despite gusty winds at altitude and inoperative ailerons, Captain Ligocki flew a "normal" approach and landing, touching down on centerline.

This crew's quick and correct assessment of a critical inflight emergency saved a valuable Air Force aircraft and the lives of those on board. *TMF* is proud to recognize this crew's excellence in airmanship.

Left: 2Lt Jesse Hamby, CP; Capt Matthew Ligocki, AC.

C-141B with European I camouflage.

## The next 5 years will see....

# More Mods for the Starlifter

by Captain Gale E. Clouse, Jr.
Associate Editor

The times, they are a changing." With the C-141 "stretch" program completed, we might normally think that major modifications to the C-141 are at an end. Well, exactly the opposite is true. Within the next 5 years, work will begin or end on a number of approved modifications, with more major mods on the way. The result of the approved and proposed mods will be an improved Starlifter ready for airlift service well into the 21st century.

### The Starlifter—A Look Back

Eighteen years ago on April 23, 1965, the first C-141A was delivered to the Military Air Transport Service (MATS) at Travis AFB, California. Production occurred at a steady rate and by February 1968, the 284th and final C-141 was delivered to the Air Force.

Eleven years later, in September 1979, the production phase of the C-141B "stretch" program began in earnest as the first Starlifter arrived for factory input at the Lockheed-Georgia factory in Marietta, Georgia. The C-141A became the C-141B model as the Starlifter was "stretched" 23.3 feet and given an aerial refueling system. The increased length added three more pallet positions equating to 2,100 cubic feet of carrying capacity. With the aerial refueling capability, MAC gained additional flexibility in performing its worldwide airlift mission. During the "stretch" program, 270 C-141s were modified, and the program was completed in June 1982, ahead of schedule and under budget. Another important C-141 modification, "Pacer Ramp," was also completed in 1982. Pacer Ramp is a cargo ramp locking modification which simplifies the old locking system by reducing the number of components.

### Approved Modifications

The C-141 fleet has a number of funded modifications, both underway and planned. First, we'll look briefly at selected approved mods.

- **Pilot Operable Radar.** This modification removes the 1960s-vintage APN-59 radar and replaces it with a pilot operable radar. Features of the new radar include color presentation, digital scope, beacon mode, two ground mapping modes, and a warranty for a mean time between failure (MTBF) of at least 500 hours. The modification began in April 1981 and is scheduled to be completed by the fourth quarter of FY 83.
- **Structural Integrity Mods.** There are

several approved structural integrity initiatives, including fuselage station (FS) 958 and wing station (WS) 77 repairs, the Pacer fatigue modification and the windshield post modification.

—Cracking of the FS 958 failsafe strap was first discovered in September 1979 during inspection of the C-141 fatigue test aircraft in the course of the "stretch" program. The prototype repair was accomplished in December 1979 and fleet modification will be completed in FY 84. The WS 77 problem directs rework of all fastener holes at WS 77.7, the location of the inner and center wing rear beam lower cap. FS 958 and WS 77 repairs are being conducted by Lockeed-Georgia at Air Force Plant 06.

—The Pacer fatigue mod directs the rework of underwing fastener holes, and the installation of fatigue-rated fasteners and doublers in selected areas. This program is being accomplished during scheduled depot maintenance and should be completed by December 1985.

—Windshield Post Mod. Another problem found during pressure testing in the "stretch" program were cracks coming from under an existing C-141 windshield post. Subsequent inspections confirmed the problem was fleet wide. Warner Robins Air Logistics Center (ALC) has designed a modification to repair the cracked structure using doublers installed at the windshield post to distribute loads over a wider area. This modification will be installed by depot field teams and should be completed in late FY 84.

• **Flight control modifications.** Presently there are four approved C-141 flight control modifications. These include the rudder power control unit, the aileron power control unit, the aileron structural mod, and the single axis rate gyro.

—The rudder power control unit (PCU) has been the cause of numerous flight control malfunctions. After study, the Air Force found that frigid inflight conditions caused binding in the unit, which in turn resulted in unacceptable flight control response. The Oklahoma City ALC mod of the rudder PCU has solved the problem and work on all Starlifters will be completed in FY 84.

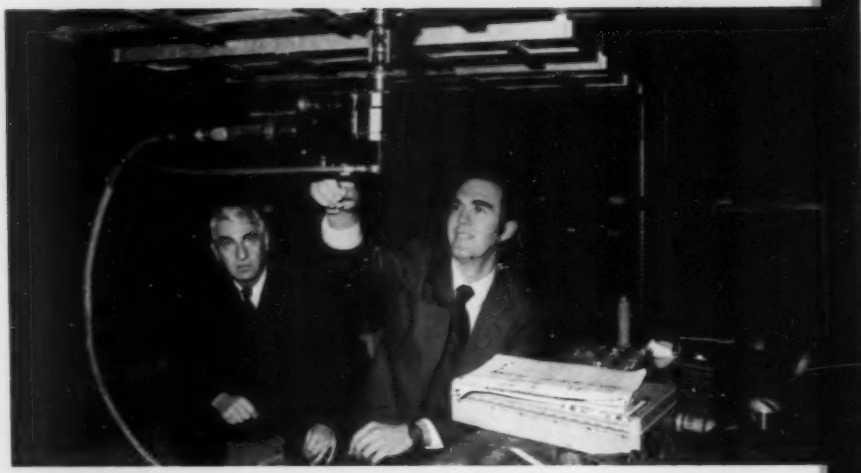
—A similar problem exists in the aileron PCU. A modification has been developed to improve cold temperature operating characteristics and reduce unwanted movements and lagging and shooting of control inputs. The program, which costs approximately $1 million, starts this year and fleet retrofit should be completed by the end of FY 84.

—Aileron structural modification. Failures of the three aileron rib caps have caused the hinge and back-up structure to give way, resulting in jamming of the aileron. This mod involves a structural beef-up of the aileron, replacing the rib caps and adding additional strength to offset the assymetrical loading of the two actuators. This mod should be completed by June 1983, about three months ahead of schedule.

—The present single axis rate gyro doesn't provide a reliable yaw signal to damp out inherent dutch roll tendencies of the Starlifter. The mod will replace the gyro with the latest state-of-the-art sensor. Reliability increases from 2,300 to 37,000 hours MTBF, and this program will be completed in FY 84.

New AN/APN-169C SKE Flight Command Indicator. Courtesy: Sierra Research Corp.

Cockpit Voice Recorder control unit. Courtesy: Lockheed Aircraft Service Co., Ontario.



Right: Mr. Edward Dellinger, the Pacer Fatigue Program Manager, explains the function of the automatic speed and feed tooling to Colonel Joseph Germani, C-141 System Manager.

Below: Fuel Savings Advisory System control unit. Courtesy: Lear Siegler, Inc.

• **Flight Recorder and Voice Recorder.** The present C-141 flight data recorder has been of limited value due to its low reliability and limited capability associated with the obsolete foil tape and stylus design. In addition, its present location in the avionics bay makes it vulnerable to destruction during a crash. The new digital flight data recorder (DFDR) will be located in the Starlifter T-tail. The funded program calls for DFDRs and cockpit voice recorders (CVRs) to be installed in both C-141s and C-130s. The new DFDR and CVR avionics will also be commercial, off-the-shelf equipment. C-141 installations should be completed by March 1984.

• **Station Keeping Equipment (SKE).** This modification corrects known deficiencies experienced by SKE-equipped C-141s operating in close proximity to each other. The mod calls for equipping 80 Starlifters with the latest AN/APN-169C SKE configuration. MAC's present 62 SKE-equipped aircraft will also get the new configuration. Equipped with a color indicator built by Bendix Corporation, the enhanced SKE equipment features a four-channel receiver/transmitter, slot muting, a new coder/decoder and expanded flight command indicators to eliminate interference problems and improve reliability and maintainability. When the SKE mod is completed in July 1985, the 142 SKE-equipped Starlifters will enhance MAC's all weather brigade airdrop capability.

• **Fuel Savings Advisory System (FSAS).** In November 1978, the Air Force directed a series of joint efforts by the Air Force Systems Command and the Air Force Logistics Command to test and procure a fuel savings advisory system for the B-52, KC-135, C-5 and C-141 aircraft. Lear Siegler won the competition for the C-141/C-5 aircraft in June 1981. Installations will begin in the third quarter of FY 83 and will be completed by August 1984. The system should save 19 million dollars in fuel during the first year.

The FSAS, INS (inertial navigation system), radar and SKE (station keeping equipment) modifications have highlighted the need to effectively integrate and display the cockpit information being provided. The APS-133 color weather radar, because it uses a digital scope, provides a convenient means of displaying SKE, INS and FSAS information. A

display interface unit (DIU) has been tested on the prototype C-141 FSAS aircraft and DIU installations began in April 1983.

- **Fire and Overheat Detection System.** The proposed system replaces the existing electrical sensing system with a gas type system and will virtually eliminate false alarms, besides being less costly to maintain. Installations begin this year and will be completed by the end of FY 84.
- **Secure Voice.** UHF, VHF, and HF Starlifter radios will have secure voice capability with this mod. Installation of VINSON/PARKHILL secure devices for C-141 radios will be completed in FY 86.
- **Standard Central Air Data Computer (CADC).** The present analog CADC is experiencing mechanical wearout and has a low MTBF. A new standard CADC is being procured for the KC-135, F-4, F-111, C-5 and C-141 fleets. The C-141 installations will begin in FY 84 and be completed in FY 86.
- **Strobe Lights.** To reduce the possibility of midair collisions, C-141s may be equipped with white strobe lights on the wing tips and on the top of the horizontal stabilizer. The Aeronautical Systems Division at Wright Patterson is developing a specification for these strobe lights.

**Proposed Modifications**

Presently, there are six major proposed, but presently unfunded, C-141 modifications. These mods will involve: (1) elevator mechanical feel; (2) the automatic flight control system/all weather landing system (AFCS/AWLS); (3) engine instruments; (4) the life history recorder; (5) winglets; and (6) the wing upper surface. The wing upper surface mod will be a follow-on to the Pacer fatigue mod and should be accomplished during FY 86-89. In this structural integrity initiative, upper wing surface fasteners will be replaced with state-of-the-art fatigue-rated fasteners. This mod, along with the Pacer fatigue mod discussed earlier, will be necessary for the C-141 to achieve a 45,000-hour economic service life. Another possible modification is the installation of the combined altitude radar altimeter (CARA). The CARA replaces the existing Starlifter radar altimeter with a standardized digital 0—50,000 feet system. Expected MTBF for this new system should be 2,000 hours.

**On-Going Initiatives**

The Air Force C-141 corrosion prevention improvement program began in June 1977, and major projects have included the use of a European I camouflage paint scheme and the development of a new C-141 fiberglass latrine. In July 1981, HQ USAF directed that all MAC Starlifters be painted European I camouflage by the end of FY 86. This mod will lower the aircraft's infrared signature and overall visibility in the European environment. Painting is being performed at Warner Robins ALC at the rate of 31 aircraft per year as a part of regularly scheduled PDM. Additionally, some 77 aircraft are scheduled for completion at a contractor paint facility. Total European I C-141 conversion cost is $34 million. Installation of a fiberglass crew latrine for the fleet has recently been completed. The new latrine helps prevent corrosion to the adjacent aircraft structure, a problem in the past.

**Depot Maintenance**

Warner Robins ALC, the C-141 programmed depot maintenace (PDM) facility, performs an impressive array of ongoing work for our Starlifters. C-141 maintenance at Robins AFB involves the normal PDM tasks (including stripping and painting aircraft), accomplishing depot level maintenance modifications, and peforming selected analytical condition inspections (ACIs). The present C-141 PDM cycle will change from 46 months to 48 months in FY 84. Each C-141 will average 92 days in depot maintenance, ACI and modification work. This work is extensive, taking over 18,000 manhours per aircraft to complete the PDM process and ongoing modifications.

**Conclusion**

Colonel Joseph G. Germani, Air Force Logistics Command overall C-141 System Manager at Warner Robins ALC states, "The C-141 is a mature weapon system and highly reliable aircraft. AFLC and MAC are working together to modify and maintain the Starlifter to meet the future needs of MAC and its users." As we've seen, the C-141 has a distinguished 18 years of operational service. Modifications to the Starlifter mean that MAC's "workhorse" will be safe and useful to the year 2000—and beyond.

# MAC INDIVIDUAL FLYING-HOUR MILESTONE AWARDS

Lt Col Morris B. Baxter, 68 TAS
Lt Col Frederick P. Curtis, 300 MAS
MSgt Harold W. Browning, 312 MAS
MSgt Earl T. Crabtree, 312 MAS

Lt Col Gordon L. Boozer, 20 MAS
Lt Col Richard K. Cornish, 16 TATS
Lt Col John B. Curtis, 86 MAS
Lt Col Byron L. Hooten, 39 TAS
Lt Col Conway B. Jones, Jr., 312 MAS
Lt Col John F. Peters, 312 MAS
Maj Alden H. Armentrout, 39 TAS
Maj Robert F. Bryan, II, 312 MAS
Maj Lloyd L. Burtsfield, 86 MAS
Maj Frank A. Cassulo, 37 TAS
Maj Joel E. Deters, 37 TAS
Maj John T. Halliday, II, 312 MAS
Maj Richard S. Howze, 39 TAS
Maj John L. King, 68 TAS
Maj Robert L. Miller, 75 MAS
Maj Jeffrey B. Pearson, 16 TATS
Maj John A. Pfanner, III, 75 MAS
Maj Carl C. Powell, 158 TAS
Maj Allen J. Schneider, 300 MAS
Maj Ross P. Van Lerberghe, 39 TAS
Maj Victor V. Ventura, 7 MAS
CMSgt Thomas A. Piggot, 39 TAS
CMSgt James J. Winemiller, 312 MAS
MSgt John R. Buckhingham, 312 MAS
MSgt John E. McGill, 312 MAS
MSgt Jimmy R. Mitchum, 312 MAS
MSgt Howard N. Shearer, 167 TAS
MSgt Lee A. Snyder, 920 WRG
MSgt Michael G. Winn, 37 TAS
TSgt Lloyd D. Brown, 16 TATS
TSgt Stephen C. Clark, 7 MAS
TSgt Rudolph Hayes, 312 MAS
TSgt Jesse L. Jackson, 39 TAS
TSgt Robert D. McCorkle, 86 MAS
TSgt Harold R. Rehm, 7 MAS

Maj Anthony J. Roget, Det 22, 40 ARRS

(Ranks and units are those at time of award. See MACR 900-3 for details on how to apply for your own milestone award.)

# C.R. TERROR

## The Pompous Pilot performs an ocean-going touch 'n' go!

Where is that Mediocre Misfit?" Colonel Fang's booming bellows bounced off the squadron's silent walls. "Terror, wherever you are, stop what you're doing and get out here *now*!" It was obvious the DO needed MAC's Most Senior Major five minutes ago. C.R. neatly put the latest copy of *The MAC Flyer* down on the desk and walked out of the squadron's safety office, and right into Colonel Fang. "Ha haaa! So, that's where you've been hiding out you, you imitation goldbrick," Fang snarled, bearing his menacing molars.

"Hiding? Me? Oh, no sir. I was definitely not hiding." The Master Manipulator was the picture of virtuous innocence. "I had some very pressing business which couldn't go unattended. Besides, sir," the Fast-talking Flyboy continued, "the walls are double insulated with sound-absorbing acoustic tile, you know and...."

"Save it, Major. I don't have time!" The DO motioned C.R. into the squadron's combination lounge, pool room and dispensary. "Sit down, Terror. This shouldn't take too long." Colonel Fang paced in front of the Worried Warrior. "Terror, you are the only pilot I have left to fly a very important low-level airdrop mission with my very best crew." Fang paused to glance at the ceiling. "Why the Outer Slobovian Type ZX flu virus had to hit every pilot but you, I'll never know, but I suppose the die is cast."

"Did you say someone had died in a cast?" asked the Mental Midget. Fang again bared his canine-like teeth, this time growling.

"No, Major. No one is dead, yet, but if you keep up your comments, you are teetering on the razor's edge." Fang continued his pacing. "Terror, you are going to fly copilot for Lieutenant Colonel Hans N. Ellboze and my most highly qualified squadron crew. We've got to get this load of Form-1s to the ALCE at Woodstock DZ on the coast." Fang stopped long enough to light up a 5¢ Stogie cigar. "In order to make it more realistic, you and the crew will fly a modified escape off the DZ back down to 300-foot contours, then out over the water to avoid the Army's simulated triple-A sites on either side of the DZ. Any questions, Major? Good! Colonel Ellboze will be here with the rest of the crew shortly. Until then, study this route chart."

C.R. glanced at the route neatly scribed on the TPC with indelible India ink. The route showed the crew would overfly vast stretches of desert before hitting the DZ. After the drop, they would escape straight ahead over the water, follow the coast back to a safe point, then climb back to cruise altitude for the return flight back.

"Should be a piece of cake,

Colonel Fang. After all, I am noted for my superb flying sk..."

"Knock it off, Major. If I know Hans, he'll have three orders for you, but I'll let him 'brief' you on those." Colonel Fang laughed menacingly as he left the Befuddled Field-grader in the lounge. But before C.R. could draw another complete breath, a hulking lieutenant colonel stood in the threshold.

"You must be Terror. I'm Ellboze."

"Glad to meet you, sir. Allow me to introduce myself. I'm Major C.R. Terror, world's greatest pi...." Surprisingly, the major's monologue was cut off in mid-boast.

"Save the malarky, Major. While we're on this trip, all I want to hear out of you is the checklist, your response to the checklist—'copilot'—and 'mayday.' Got it?"

Taken aback that no one would want to listen to his sterling words of wisdom, the Miffed Major was left momentarily speechless. "But sir, I was just going to give you my background and...."

"Don't you listen to anyone, Major? Watch my lips. I said checklists, copilot and mayday." For a change, a speechless C.R. Terror, Aviator Extraordinaire, sighed resignedly and nodded.

Shortly after that exchange, the rest of the crew walked into the squadron to await transportation to the C-130. All of the other crewmembers, it seemed, flew together regularly and had known each other for years. Each sported a seemingly custom tailored flight suit, spit-shined flying boots, square jaw and a multitude of flying hours. C.R. was most uncomfortable. To make matters worse, the loadmaster's 20,000 hour accident-free flying patch made C.R.'s 7.5 hour patch laughable. It looked as though Fang was correct. He had really stacked the deck against the Magnificent Major.

Upon arrival at the Herk, Ellboze gathered his stalwart crew, and C.R., for the crew briefing. "I've already briefed the copilot here on his duties. As for the rest of us, it's our standard briefing. Any questions?"

"Yes, sir," pitched in the loadmaster. "Any chance of doing a little 'trolling' once we get out over the water?"

"You betcha, G.I.!" Ellboze replied enthusiastically. "We got to have ourselves some fun now and then, don't we?"

"Q-1 in judgment," replied the navigator. "Let's go!"

Although C.R. was a bit apprehensive about flying with all those neatly pressed flying suits and spit-shined boots around him, he was dutifully impressed by the way the checklists were answered and by the obvious abilities of each of the crewmembers. Yep, he thought to himself, these guys are a really professional bunch. Not a missed checklist item, thanks to his skillful rendering of T.O. 1-C-130B-CL-1, of course. Besides that, Ellboze possessed a

good set of hands and his nav knew just how to read a JOG chart down to the "nth" degree.

Once on the low-level route, though, C.R. began to detect occasional deviations below the 300 foot minimum altitude they were supposed to be flying.

"Pilot, copilot," C.R. thought he would at least mention the altitude deviations to the AC. "Don't you think our altitude is a bit low?" he reminded Ellboze as the radar altimeter went through 50 feet AGL.

"Copilot, what three things did I tell you to say?" Ellboze asked the Fumbling Field-grader sarcastically.

"But sir," C.R. protested, albeit in a much lower voice, "I thought you might just want to climb back to...."

"You leave the flying to me, copilot, and I'll leave the checklist reading to you." With those words, Ellboze waved his hand across his throat indicating his copilot should cut it off. "You just run the checklists, say copilot and call mayday. Got it?" The Rankled Right-seater nodded a silent "yes."

As the flight progressed, Ellboze would take any opportunity to "sneak" down to extremely low altitude for some "sight-seeing." His crew, used to his skilled maneuvering, never once protested his deviations from altitude or regulations. On one short leg, Hans even got down *below* 50 feet.

The ensuing slow-down and drop of the Form-1s for the ALCE, however, came off without a hitch, much to the relief of the ALCE troops, and the crew performed the modified escape and clean-up checklists with split-second clock work. Now at 300 feet above the water, Hans pointed the big black nose of the Herk toward the ocean and screamed down to mere feet above the salt spray.

"Yahoo! Look at that rooster tail!" The loadmaster yelled into his hot mike, nearly deafening the crew. "Man, we sure do a mean imitation of a speed boat."

C.R., on the other hand, gripped the copilot's overhead handle like he was trying to climb out of the brown-and-green machine.

"Where are you going?" cried the Terrified Titan. "Any lower and I'll have to report a fish strike."

"Calm down, copilot," soothed the navigator. "Why, Hans here has been doing this sort of thing for years and he's never hit anything yet."

Just then, as though someone was waiting for that line, the C-130 jerked forward and down with enough force to put the crew into their shoulder harness. C.R. grabbed the yoke with his right hand and pulled with all his strength while simultaneously switching the trim from "normal" to "emergency." The nose of the Herk came back up into the air, but not in time to keep the tail from hitting the water. With a resounding crash that sent vibrations throughout the plane, the water-skiing C-130 staggered back into the air, clawing for altitude.

Once the crew had regained some of their composure, C.R. asked the question.

"What happened back there, pilot?"

"I wish I knew. I just lost it," replied a stunned but, grateful-to-be-alive, Hans Ellboze. "I just lost it. Think we ought to do a controllability check?"

"Affirmative, pilot," replied the Ace of Aerospace. "No telling what we picked up back there...or, what we may have lost."

Luckily, there wasn't any apparent damage, save for the additional gray hairs on the crew and a skipped heartbeat or two. Still, they declared an emergency and flew directly back to McMac AFB for a precautionary straight-in. Once on the ground, the flight engineer did his usual postflight walk-around.

"Well, engineer, did you find anything?" asked the Nautical Neophyte.

The flight engineer just shook his head.

"Well, Major Terror, we lost both urinal drains, a couple of panels and maybe got damage to a couple of the longerons. And I also found this skewered on the UHF antenna." With that, he held up a small flying fish.

Shaking their heads forlornly, Ellboze and his crew dejectedly stepped on the bus for the long ride into the squadron.

"Major Terror," he began, "I wish I had listened to you, now. I apologize for my attitude and my actions this afternoon." Hans offered his hand to the Pudgy Pilot's palm.

"Think nothing of it, Hans old boy," replied C.R. as he shook the lieutenant colonel's hand vigorously. "Why, I've had plenty of these experiences m'self." Then, thinking back to the inevitable meeting the crew was in for with Colonel Fang, C.R. added, "By the way, Hans, I highly suggest you invest in some stainless steel skivvies before meeting with the DO, or you, too, may end up looking like this fish."

"Better to look like a fish, C.R., than to sleep with them, right?"

"Right you are, Hans. How right you are." ✈

## T-tailed Tail-Dragger

About an hour after takeoff while in cruise flight, a Starlifter's right main landing gear suddenly showed unsafe. The crew elected to descend early enroute to a Midwestern base to trouble shoot the gear. During the descent, they updated their weather with the destination base metro and the flight engineer recomputed the landing data. Nearing their enroute stop, the C-141 crew lowered the gear and it indicated down and locked. The crew then installed the landing gear pins and flew a normal approach and "touchdown."

The tower controller, watching the Starlifter roll out, reported sparks and flames coming from beneath the C-141. Postflight inspection revealed a 6-foot belly scrape on their cargo loading ramp. Further investigation revealed the flight engineer had made a 34,000 pound error in computing landing gross weight and a resultant 10 knot error in computing approach and landing airspeed.

## Unconscious Passenger

A C-141 crew on an exercise mission in the southeastern U.S. was alarmed when one of their passengers, a 31-year old Army troop, passed out during cruise at FL 390. The unconscious soldier was revived with oxygen administered by the loadmasters and was treated by an Army doctor on board the Starlifter. After landing, the green-suiter was examined and released by Army medical personnel. Possible causes for this incident include hyperventilation and hypoglycemia. The fact the victim had eaten only a bowl of soup during the previous 48 hours seemed especially significant.

## Wing Ding

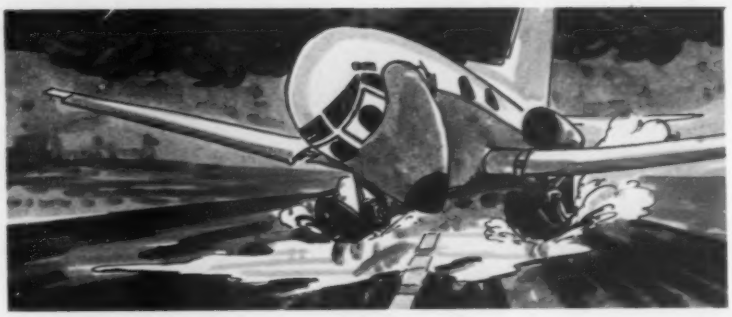
A C-130 was on climbout from initial takeoff for a tactical low-level formation flight. The Herk pilot, seeing a large bird heading his direction, turned the aircraft to avoid the bird. The bird, though, didn't perform an evasive maneuver, and struck the C-130's outboard leading edge.

While these bird strikes occurred below 1,200 feet, they can occur at almost any altitude. Be on the watch near both dawn and dusk, and especially if low clouds are present.

## ON THE SKIDS

It was going to be one of those landings Sabre knights have learned to live with, or at least tolerate—a wet runway landing. No sweat, though. The anti-skid was "on" and in the green. So, down final approach came our two intrepid aviators, on course and on airspeed. Correcting for a little crosswind puts the T-39 on the right side, touching down with an estimated vertical velocity indication of 500 feet per minute. Very shortly after touchdown, the anti-skid light came on, meaning the anti-skid had failed. The brakes were released and reapplied lightly, but the miniliner started to drift further to the right. The rudder was neutralized and the nosegear steering was engaged at about 85 to 95 KIAS. With the nosegear steering working, the pilots shut down the left engine to help them maintain control. It seemed to work for a while and the '39 tracked straight down the runway with the nose 5° to 10° off centerline. The aircraft then started to drift right again, but this time it ran off the side of the runway. The left wingtip underside skidded on the non-load bearing asphalt before the Sabreliner finally came to a somewhat ignoble halt 50 feet from the runway's edge, with the nose pointing 90° off runway heading.

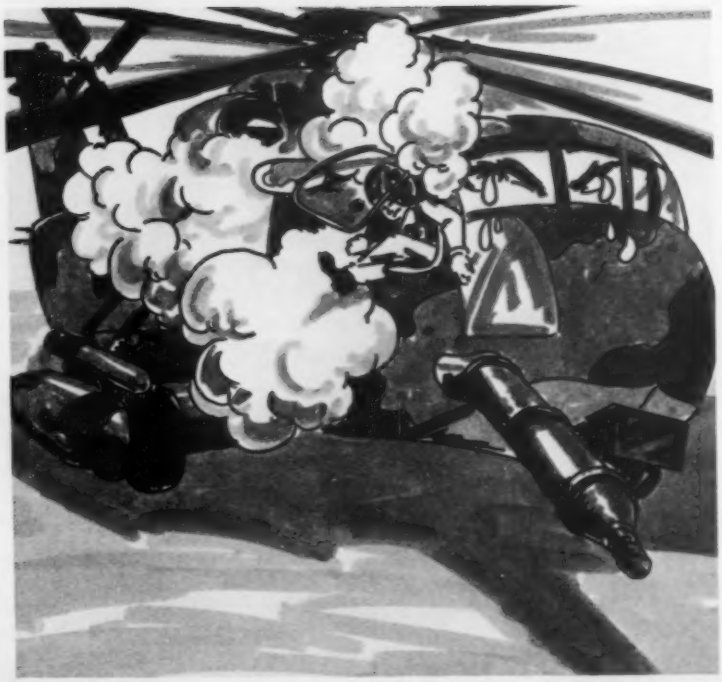
There's really not a whole lot to say about this little skidding story. It does prove one thing: Murphy was right!

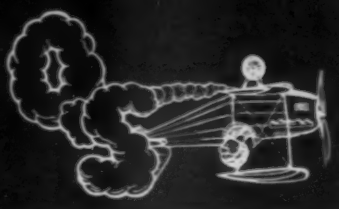


## Hot-Wired Helo

The Jolly Green had taxied into position for hover checks on a nearby helipad and the crew had just completed the before-takeoff checklist when the pilot smelled an unusual odor. At the same time, the flight engineer turned around and saw smoke starting to fill the cabin area. Discovering smoke and flames coming from a wire bundle leading to the number 2 engine, the engineer grabbed a portable fire extinguisher and quickly put out the flames. Meanwhile, the pilots executed an emergency shutdown of all systems and the crew safely exited the helicopter.

Maintenance investigation revealed the wire bundle had shorted for an undetermined reason and burned the wires just below a cannon plug.





## HAIL(acious)

Before departing a foreign base, a C-130 crew received a weather update. The prognosticators indicated some thunderstorms of the isolated variety might very well appear in the vicinity, but couldn't give the green-suited crew any hint of the direction. Seems the ground weather radar was not working. Anyway, the brown-and-green Herk slips the surlies and promptly leaps into a "heavy rain" shower. Luckily, their trip through this airborne carwash lasts only a few minutes, and they arrive safely at their next destination within an hour.

As our now thoroughly-washed Herk blocks in and shuts down, a hail storm strikes the field, forcing the crew to remain sealed within the plane. The storm dissipates in about 15 minutes and the largest hail recorded is "pea-sized." After the crew enters crew rest, some maintenance types find damage to the C-130 including: some hairline cracks on the nose radome; a small hole in the SKE radome; a missing right nav light; a cracked left nav light; and a broken taxi light. Though some of the damage might have occurred on the ground during the hail storm, the damage to the taxi light indicates it was probably a hail shower the Herk flew through, not just a "heavy rain" shower.

All MAC-types are periodically briefed on the hazards associated with thunderstorms and heavy rain showers. In order to deal effectively and safely with these situations, though, we must receive and use accurate and up-to-date weather information.

## NOTABLE QUOTE

"If you can't see the bright side, polish the dull side." —*Approach.*

# AFTER DEADLINES

**C-130A GEAR UP TOUCH AND GO**—Another C-130A crew has performed a touch and go with the gear up. During a traffic pattern, the pilot flight examiner reduced power for a simulated two-engine approach and silenced the gear warning horn, thereby eliminating any further audible unsafe gear warnings. Later, as the flight examiner was giving the checkee some instructions, he called "gear down and checked" when, in fact, the gear was still up and locked. The tower operator spotted the gear-up condition as the Herk was in the flare and advised the crew. The crew quickly checked the gear, but it was $37,000 too late. The aircraft contacted the runway as the crew attempted a go-around. The aft underbelly skin of the C-130 was damaged and two UHF antennas, an anti-collision light and a bumper pad (tail skid) were destroyed. A design deficiency in the C-130A landing system has been identified as a factor in two previous C-130 mishaps, and a modification to correct the problem is being worked.

**FLIP USER COMMENT CARD**—The Defense Mapping Agency Aerospace Center (DMAAC), St. Louis AFS, recently began a 6-month test of "FLIP User Comment Cards." The pre-addressed and postpaid cards are found in DOD Flight Information Publication (FLIP) enroute supplements and can be used to report errors, corrections, omissions or changes needed to improve FLIP products. Please use these cards to give DMAAC feedback on FLIP. Information courtesy: DMAAC/PRRF.

**MACPLAN COMPUTER FLIGHT PLANS SAVE FUEL**—Optimized MAC Computer Flight Plans (OMCFPs) became operational in August 1982 and their use is generating fuel savings for MAC operations on both long and short routes. If you have questions about your OMCFP, contact your friendly flight planner at the following Autovon numbers: 21 AF/DOCF, 440-2179; 22 AF/DOCF, 837-2448; and for T-39s, HQ MAC/DOOF at 638-4032. Remember to give your CFPI number (found in the upper right hand corner of CFP) to the flight planner. For more information on MACPLAN CFPs, see June 1982 *TMF*, "Changes in the Wind." Information courtesy: HQ MAC/DOCS.

**LOADMASTER EARNS AWARD FOR BRAVERY**—Master Sergeant David C. Getty, a 109 TAG loadmaster with the New York Air National Guard, was recently awarded New York State's highest honor, the Medal of Valor, during ceremonies at Schenectady, NY. The award was given after he single-handedly extinguished a munitions fire on board a 109 TAG C-130D aircraft flying a resupply mission in Greenland. *TMF* salutes Sergeant Getty's bravery.

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